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(54) Improved screw.

(57) An improved screw is described, particularly suitable for high-speed screwing with mechanical tools, providing an absolutely guaranteed holding power and not subject to damage during insertion because of the special structure of the thread which extends to the point of the screw, accompanied by an intermediate thread which provides exceptional self-tapping qualities.

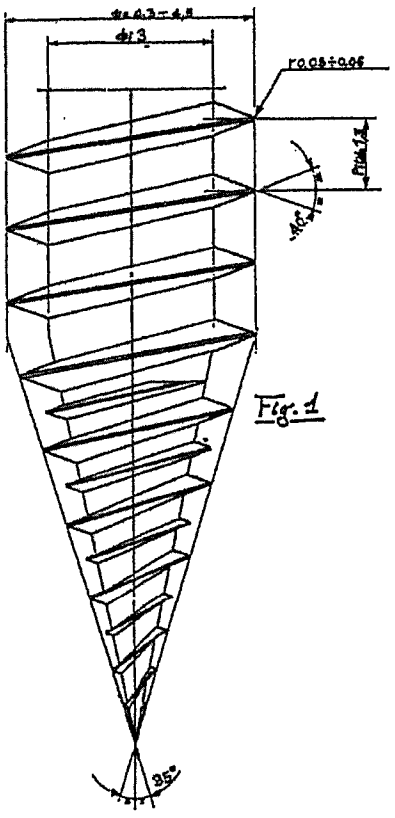

Fig. 1

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"IMPROVED SCREW"

The invention relates to an improved screw with a special structure which constitutes an enormously important technological advance in all screw application sectors and, in particular, in those industrial sectors involved in mass production with mounting and assembling lines where it is essential to respect programmed times.

It is a known fact that it takes a disproportionately long time to apply a screw if one considers the small size of the piece and the considerable number of screws which are needed to mount any component of manufactured products. Therefore, in theory, a large number of people or robots must be employed simply to apply the innumerable screws which are necessary for any mounting or assembly operation or we must resign ourselves to extending the times in order to allow people or robots to apply all the screws which are necessary.

Therefore, attempts have been made to produce high-speed tools to reduce the screwing time which is required but it was then realised that the screws which existed would not support such high speeds and, therefore, the aforementioned tools had to be operated at a much lower speed than they were capable of. In addition, a large number of the existing screws have their threads stripped during application and thus screws in existing use cannot be guaranteed to hold and, as everyone knows, after a brief period of use of any article the screws begin to loosen, to fall out, to get lost and thus the article in question needs to be repaired or serviced and sometimes even to be thrown away.

Thus, the importance is obvious, in practical and economic terms, it is obviously important to have a screw available which gives maximum guarantees of holding power, that does not strip its thread during application, that can be applied at high speed with existing modern tools and that can advantageously replace existing screws, particularly self-drilling screws with drill points, together with all other types of screws in industrial use.

These problems are brilliantly and completely solved by the improved screw of this invention which can certainly be considered revolutionary because of its enormous effect in all sectors in which large numbers of screws must be applied in industrial production processes, where the reduction of the time taken to apply one single screw, multiplied by the number of screws required, will obviously produce incredible high time savings and, therefore, cost savings. In addition, this is combined with improved holding performance, no thread stripping, reliability and long life.

The invention is constituted by the application or construction of a thread which is intermediate to the existing thread, more or less accentuated according to the individual case, which is inserted in the conical or frusto-conical part or in the terminal portion of the improved screw of this claim.

The improvement proposed in this claim relates to all standard and special manufactured screws with or without a point and to all possible similar products in production at present or to be produced in the future, to which this system can be applied.

Screws which have been provided with this intermediate thread can be used in all sectors which utilise plastic materials and derivates, timber and derivates, metal laminates and derivates, both ferrous and non-ferrous, the building industry or sectors with various and mixed applications of the aforementioned materials, starting from the thinnest up to medium or thick thicknesses.

Compared to normal means of fastening and assembly, the screws of this invention have the following advantages:

(1) Possibility of high speed screwing.
(2) Screwing with reduced torque effort.
(3) Improved holding performance.
(4) Improved holding torque.
(5) Improved unscrewing torque.
(6) No need for preliminary drilling.

Another basic advantage of these screws is that the material can be drawn before and during the drilling and thus there is a greater holding surface.

The improved screws provided with this factor, and thus having the advantages listed above, can replace all self-tapping screws and multi-start screws.

The scope, characteristics and advantages of the improved screws of this invention are clearly demonstrated in the attached drawings which show two of the innumerable possible embodiments, in which Figure 1 and Figure 2 are enlarged front views of the two aforementioned embodiments, with some typical parameters given in centimetres.

The screw illustrated in Figure 1 is particularly suitable for sectors which use fine and medium thick metal sheets (0.1 to 1.5 mm), in which electrical, pneumatic, electropneumatic and hydraulic screwing tools are used or manual-automatic or production line machines or tools are used and on metal sheets 1.5 mm thick or more when screws are applied by means of automatic cycle screwing equipment (automatic line screwing machines with manual feed or servo-feed).

The screw illustrated in Figure 2 is particularly suitable for sectors which utilise plastic laminates, timber and their derivates.

The diameter of the intermediate thread must not be greater than the diameter of the core of the screw to which the system is applied.

In cases in which there are very special utilisation requirements, the diameter of the intermediate thread can also be greater than the diameter of the conical, frusto-conical or terminal part of the improved screw, up to two-thirds of the total length of the screw itself. In this way the thread acutally encroaches on the cylindrical part of the core and will have a variable diameter which is larger than that of the core itself.

While the screw shown in Figure 2 is constructed only with the application of the intermediate thread, the screw illustrated in Fig. 1 falls within the scope of protection of the patent both with and without the intermediate thread since it is an improved screw of a completely original concept. The angle of the thread can vary from 30° up to 65° according to the application. The pitch can vary from 0.5 mm to 15 mm according to the diameter of utilisation and the type of application. The radius of the tip of the thread can be between 0.1 mm and 5 mm.

The normal diameters of the improved screws which can be produced can be from 1 mm to 50 mm and the lengths can be from 1 mm to 1,000 mm. The angle of inclination of the apex of the pointed screws can vary from 18° to 90° and that of the screws with a frusto-conical point can vary 4° to 90°.

The improved screws of this invention can be manufactured from ferrous and non-ferrous materials and their derivates. The possible thermal treatments which can be used for carbonitriding, the various hardening and tempering systems and all the other thermal treatments used in this technological field.

The examples illustrated in Figures 1 and 2 are only two of the vast variety of possible solutions for all types of applications, bearing in mind what has just been said about the very wide range of possible variations of all the parameters. i.e. pitch, angle of thread, radius of the thread tip, nominal diameter, angle of inclination of the apex, screw length and material employed.

Thus it must be understood that all the modifications, additions, and/or substitutions of elements which can be made to the improved screw of this invention fall within its spirit and scope without in any way limiting the scope of protection as defined in the claims which are attached herewith.

Claims

1. Improved screw, characterised by the fact that it has a thread intermediate to the existing thread, which is inserted in the conical, frusto-conical, terminal part of the screw.

2. Improved screw according to claim 1, characterised by the fact that the diameter of the intermediate thread does not exceed the diameter of the core of the screw.

3. Improved screw according to claims 1 and 2, characterised by the fact that the intermediate thread encroaches on the diameter of the conical, frusto-conical or terminal part and also extends onto the cylindrical part of the core, arriving at approximately two-thirds of the total length of the screw.

4. Improved screw according to one or more of the preceding claims, particularly suitable as self-tapping screws for application with high-speed tools.

5. Improved screw according to one or more of the above claims, characterised by the fact that the pitch varies from 0.5 mm to 15 mm according to the diameter of utilisation and type of application.

6. Improved screw according to one or more of the preceding claims, characterised by the fact that the radius of the tip of the thread can vary from 0.1 mm to 5 mm.

7. Improved screw according to one or more of the preceding claims, characterised by the fact that the nominal diameter of the screw can vary from 1 to 50 mm.

8. Improved screw according to one or more of the preceding claims, characterised by the fact that the length of the screw can vary from 1 to 1000 mm.

9. Improved screw according to one or more of the preceding claims, characterised by the fact that the angle of inclination of the apex of the pointed screw can vary from 18° to 90° and that of the apex of the screws with frusto-conical tips can vary from 4° to 90°.

10. Improved screw, substantially as described in precedence and as illustrated in the attached drawings, for the scope described here above.

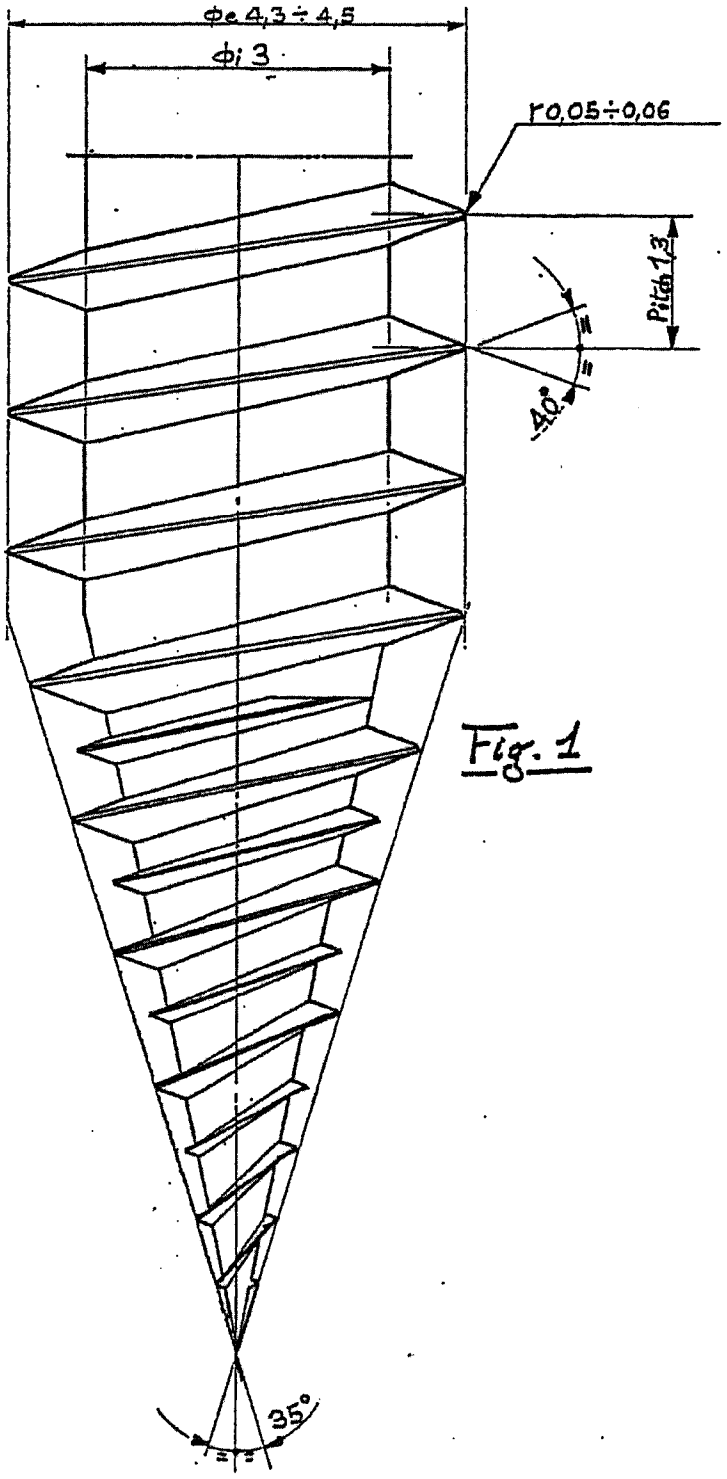

Fig. 1

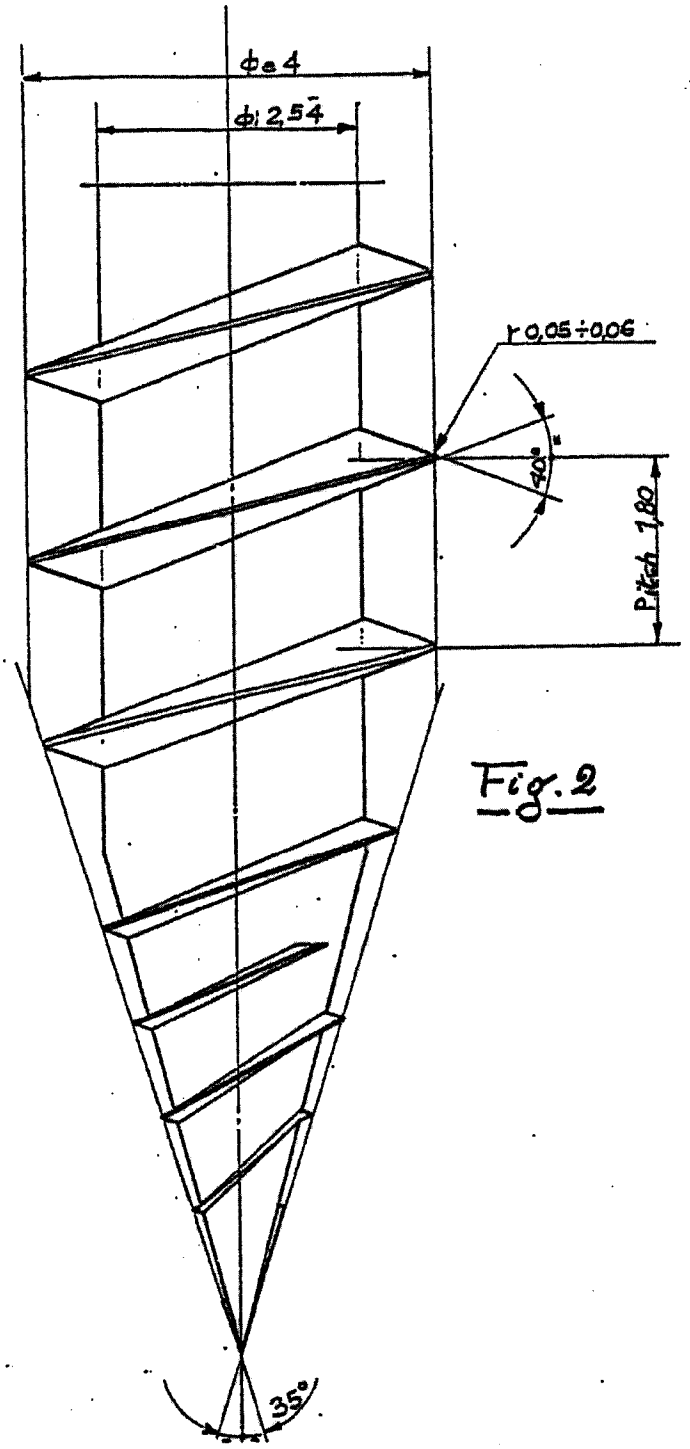

Fig. 2